This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-36. (Cancelled).

37. (New) A method for determining health of the prostate of a subject comprising determining an *in vivo* zinc ion concentration in the prostate of the subject by magnetic resonance imaging (MRI); and determining health of the prostate of the subject using zinc ion concentration level determined using the MRI.

38. (New) The method of Claim 37, wherein said step of determining the *in vivo* zinc ion concentration by MRI comprises:

administering an MRI contrast agent to said subject, wherein said contrast agent comprises a zinc ion complexing agent and a non-hydrogen imaging nucleus;

acquiring imaging signals via at least one imaging scan of said non-hydrogen imaging nucleus;

generating at least one image map comprising intensity of an image pixel derived from said imaging signal acquired during said imaging scan(s); and

correlating intensity of said image pixel at any point on said image map or on a subtractive composite of said image maps with concentration of said zinc ion in the prostate at said mapping point.

39. (New) The method of Claim 38, wherein selectivity of the contrast agent for zinc ion is at least about 100-fold greater than selectivity of the contrast agent for other metal ions *in vivo*.

40. (New) The method of Claim 38, wherein the imaging nucleus is ^{19}F.

41. (New) The method of Claim 38, wherein the imaging nucleus is introduced into the complexing agent via derivatization of the complexing agent such that one or more hydrogen atoms comprising the complexing agent are replaced by the imaging nucleus or by a functional group comprising one or more of the imaging nuclei.

42. (New) The method of Claim 41, wherein the complexing agent is a fluorinated derivative of 1,2-bis-(2-aminophenoxy)ethane-N,N,N',N'-tetraacetic acid, ethylene glycol bis(β-aminoethyl ether)-N,N,N',N'-tetraacetic acid or ethylenediaminetetracetic acid.

43. (New) The method of Claim 38, the complexing agent further comprises one or more functional groups, the functional groups enhancing *in vivo* biological acceptability of the contrast agent.

44. (New) The method of Claim 37, wherein the complexing agent is an apo-metallothionein covalently linked with a fluorine-containing compound.

45. (New) The method of Claim 44, wherein the fluorine-containing compound is Oregon Green.

46. (New) The method of Claim 43, wherein the functional group(s) comprises a targeting vector specific for a receptor.

47. (New) The method of Claim 38, wherein the contrast agent is administered orally, intravenously, transdermally, or via inhalation or direct administration to the tissue(s) or to an organ comprising the tissue.

48. (New) The method of Claim 38, wherein binding zinc ion by the contrast agent measurably alters a nuclear longitudinal relaxation time of the imaging nucleus, a nuclear transverse relaxation time of the imaging nucleus or a combination thereof, wherein intensity of the image signal from the imaging nucleus is sensitive to the relaxation time(s).

49. (New) The method of Claim 48, wherein alteration of the longitudinal and/or transverse relaxation times independently comprises a lengthening and/or a shortening of the relaxation times of about 1.5-fold to about 15-fold of the relaxation time(s) of the contrast agent prior to binding zinc ion.

50. (New) The method of Claim 49, wherein the longitudinal and the transverse relaxation times are shortened about 2-fold to about 7-fold.

51. (New) The method of Claim 48, wherein the contrast agent is 1,2-bis-(2-amino-5-fluorophenoxy)ethane-N,N,N',N'-tetraacetic acid or 1,2-bis-(2-amino-5-

trifluoromethylphenoxy)ethane-N,N,N',N'-tetra acetic acid, and the transverse relaxation time is measurably shortened.

52. (New) The method of Claim 51, wherein a first MRI image map utilizing a long relaxation delay for transverse relaxation (T_2) and a second MRI image map utilizing a short relaxation delay for transverse relaxation are generated from imaging scans such that the first MRI image map is subtracted from the second MRI image map thereby obtaining a high intensity image signal map of the Zn^{+2} concentrations.

53. (New) The method of Claim 52, wherein the imaging scan utilizes a spin-echo sequence.

54. (New) The method of Claim 38, further comprising the step of: diagnosing a disease state wherein the concentration of the target metal ion in the tissue(s) is characteristic of the presence or absence of the disease state.

55. (New) The method of Claim 54 further comprising the step of monitoring the efficacy of a therapeutic regimen to treat prostate cancer, wherein the concentration of zinc ion in the tissue(s) is characteristic of progression or regression of the disease state.

56. (New) A method for determining the presence of prostate cancer in a subject by *in vivo* magnetic resonance imaging (MRI) of Zn^{+2} ion in the subject's prostate comprising the steps of:

administering a Zn^{+2} ion contrasting agent to the subject, wherein the contrasting agent comprises a moiety selected from the group consisting of 1,2-bis-(2-amino-5-fluorophenoxy)ethane-N,N,N',N'-tetraacetic acid or 1,2-bis-(2-amino-5-trifluoromethylphenoxy)ethane-N,N,N',N'-tetra acetic acid or a combination thereof;

acquiring magnetic resonance imaging of the subject's prostate via at least one imaging scan of fluorine nucleus; and

determining the presence of prostate cancer in the subject by analyzing the magnetic resonance image.

57. (New) The method of Claim 56, wherein said step of acquiring magnetic resonance imaging comprises:

generating at least one image map comprising intensity of an image pixel derived from the image signal acquired during the imaging scan(s); and

correlating intensity of the image pixel at any point on the image map or on a subtractive composite of the image maps with concentration of the Zn^{+2} ion in the prostate at the mapping point.

58. (New) The method of Claim 56, wherein the contrast agent further comprises a functional group that is capable of enhancing *in vivo* biological acceptability of the contrast agent.

59. (New) The method of Claim 58, wherein the functional group comprises a targeting vector specific for a receptor.

60. (New) The method of Claim 56, wherein the contrast agent is administered orally, intravenously, transdermally, or via inhalation or direct administration to the prostate.

61. (New) The method of Claim 56, wherein binding the Zn^{+2} ion by the contrast agent measurably shortens a nuclear transverse relaxation time of the fluorine imaging nucleus, wherein intensity of the image signal from the imaging nucleus is sensitive to the transverse relaxation time.

62. (New) The method of Claim 61, wherein the transverse relaxation time is shortened about 1.5-fold to about 15-fold of the transverse relaxation time of the contrast agent prior to binding the Zn^{+2} ion.

63. (New) The method of Claim 61, wherein the transverse relaxation time is shortened about 2-fold to about 7-fold.

64. (New) The method of Claim 56, wherein the imaging scan utilizes a spin-echo sequence.

65. (New) A method for monitoring the efficacy of a therapeutic regimen for treating prostate cancer comprising:

administering a Zn^{+2} ion contrasting agent to the subject who is undergoing a prostate cancer treatment, wherein the contrasting agent is capable of complexing with Zn^{+2} ion and comprises a moiety selected from the group consisting of 1,2-bis-(2-amino-5-fluorophenoxy)ethane-N,N,N',N'-tetraacetic acid or 1,2-bis-(2-amino-5-

trifluoromethylphenoxy)ethane-N,N,N',N'-tetra acetic acid or a combination thereof;

acquiring magnetic resonance imaging of the subject's prostate via at least one imaging scan of fluorine nucleus; and

determining the efficacy of the therapeutic regimen for treating prostate cancer in the subject by analyzing the magnetic resonance image.

66. (New) The method of Claim 65, wherein said step of analyzing the magnetic resonance image comprises determining the concentration of the Zn^{+2} ion in the subject's prostate, and wherein the concentration of $Zn+^{2}$ ion in the subject's prostate is characteristic of progression or regression of the subject's prostate cancer.